

**REMARKS**

Claims 1, 5-7 and 16-17 are canceled herein. Claim 2 is amended by incorporating the subject matter of claim 6. No new matter is presented.

**I. Response to Claim Rejections - 35 USC § 103**

Claims 1-10 and 12-20 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Brodtkin et al (U.S. Patent No. 6,322,728) and further in view of Halloran et al (U.S. Patent No. 6,117,612).

Claim 11 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Brodtkin et al in view of Halloran et al, as applied to claims 1-10 and 12-20 and further in view of Maitland (UV Printing/UV Chemistries)

The Examiner recognizes that Brodtkin et al does not specifically teach the relationship the refractive index of the powder material  $n_1$  and the refractive index of the binding agent  $n_2$  recited in claim 2 but relies on Halloran for the teaching that the cure depth of a ceramic SLA resin is dependent upon the refractive indices of the ceramic powder and the medium.

Without conceding the merits of the rejection, independent claim 2 is amended by incorporating the subject matter of claim 6. Thus, the present invention is directed to a process of producing a three-dimensionally shaped object comprising (a) a layer forming step of forming a powder material having a refractive index  $n_1$  into a layer having a prescribed thickness; (b) a cross-sectional shape forming step of feeding an ultraviolet (UV) curable binder in a cross-sectional shape into the powder material layer formed and irradiating UV rays to cure the binder, thereby forming a bound body of the powder material in the cross-sectional shape corresponding to a cut surface of a subject to be shaped cut at a certain one plane with a binding agent having a

refractive index  $n_2$  after the curing; and (c) repeating these steps successively. Additionally, claim 2 recites that  $n_1$  and  $n_2$  satisfy the relationship of  $-0.1 \leq (n_1 - n_2) \leq 0.1$  and that a volatile component of the UV curable binder after the curing with UV rays is not more than 5 % by weight.

Applicants respectfully submit that the cited references do not teach or suggest the presently claimed invention.

With respect to the difference between a refractive index of a filler (powder material):  $n_1$  (ceramic) and a refractive index of a binding agent:  $n_2$ , the claims recite  $-0.1 \leq (n_1 - n_2) \leq 0.1$ , which is significant because one of the characteristic features of the present invention resides in providing transparency by achieving absence of voids (small voids) and small difference of the refractive indexes, even after UV curing the powder material with the binding agent. The “absence of voids (small voids)” can be technically achieved when “a volatile component of the UV curable binder after the curing with UV rays is not more than 5% by weight” as recited in amended claim 2.

In Halloran, with respect to the difference between a refractive index of a filler (ceramic):  $n(\text{ceramic})$  and a refractive index of an aqueous medium:  $n_0$ , it is described that  $\Delta n$  in  $\Delta n = n(\text{ceramic}) - n_0$  is reduced to zero. In the working examples of Halloran, the following compositions including volatile components of more than 5% by weight such as water are described.

The compositions of the working examples of Halloran are described below:

- Example 1: Silica Ceramic in Aqueous Acrylamide Solution  
Monomer 30%, Dispersant 0.5%, Remainder: Water (69.5%)

- Example 2: Silica Ceramic in Acrylamide-Water-Ethylene Glycol Solution  
Monomer 40%, Solvent 60% (breakdown: ethylene glycol 30%, water 70%)
- Example 3: Alumina in Aqueous Acrylamide Solution  
(Ceramic is not contained.)
- Example 4: Alumina Ceramic in Acrylamide-Water-Ethylene Glycol Solution  
The same as Example 2
- Example 5: Alumina in Diacrylate Solution  
(Ceramic is not contained.)
- Example 6: Alumina in Diacrylate-Dilute Solution  
(Ceramic is not contained.)
- Example 7: Hydroxyapatite in Acrylamide Solution  
Hydroxyapatite powder 30 volume%, Water 70 volume%
- Example 8: Stainless Steel in Acrylate Solution  
(Ceramic is not contained.)

The clear difference between the presently claimed invention as recited in independent claim 2 and the cited references is that in the present invention, “a volatile component of the UV curable binder after the curing with UV rays is not more than 5% by weight”. Neither of Brodtkin et al nor Halloran teaches, suggests or even recognizes the advantageous effects of this feature of the presently claimed invention and Maitland does not remedy the deficiencies of Brodtkin et al and Halloran. Therefore, the present invention as recited in independent claim 2 is not rendered obvious for at least this reason.

Claim 3 also recites the element of “a volatile component of the UV curable binder after curing with UV rays is not more than 5% by weight”, which is not taught or suggested by the cited references for the reasons set forth above. Claim 19 depends on claim 3 and is patentable for at least the same reason.

Claims 4, 8-15, 18 and 20 depended from claim 2, directly or indirectly, and are patentable for at least the same reason.

Claims 1, 5-7 and 16-17 are canceled herein, thereby rendering the rejection moot as to these claims.

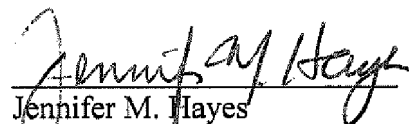
Accordingly, Applicants respectfully request withdrawal of the rejection.

## II. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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